

A collection of crabs (Crustacea, Brachyura) from the southwestern coast of India, with a discussion of the systematic position of *Nectopanope* Wood-Mason in Wood-Mason & Alcock, 1891 (Euryplacidae)

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Abstract

A report on the brachyuran crabs collected from the southwestern coast of India by the Indian research vessel FORV *Sagar Sampada* is presented. The material consists of 13 species from three genera and five families, of which four are new records for India: *Heteroplax maldensis* (Rathbun, 1902) (Euryplacidae), *Cryptopodia collaris* Flipse, 1930 (Parthenopidae), *Thalamita macrodonta* Borradaile, 1903 (Portunidae), and *Paraxanthodes cumatodes* (MacGilchrist, 1905) (Xanthidae). The cruise also obtained the first known male of *Nectopanope rhodobaphes* Wood-Mason in Wood-Mason & Alcock, 1891 (type species of *Nectopanope* Wood-Mason in Wood-Mason & Alcock, 1891), and its characters show that it is in fact a member of the Euryplacidae Stimpson, 1871. The genus had previously been incorrectly classified in the Xanthidae MacLeay, 1838.

Keywords

Brachyura, Euryplacidae, Indian Ocean, new records, rare species, revised taxonomy, systematics

Introduction

We here report on a small but noteworthy collection of brachyuran crabs obtained by a fishery research vessel off the southwestern coast of India in 2017. While consisting of only 13 species from three genera and five families, the material obtained includes several rare species, including one which has not been seen since 1891.

The discovery of a male of *Nectopanope rhodobaphes* Wood-Mason in Wood-Mason & Alcock, 1891, is significant as the family position of the genus *Nectopanope* Wood-Mason in Wood-Mason & Alcock, 1891, has been uncertain, because it was previously known only from the type female. The male characters show that *Nectopanope* is a member of Euryplacidae Stimpson, 1871, and close to *Psopheticoides* Sakai, 1969, from the western Pacific. *Nectopanope* is rediagnosed, while *Nectopanope rhodobaphes* is redescribed and figured. A male of the rarely reported parthenopid *Cryptopodia collaris* Flipse, 1930, not previously known from India, is figured. The euryplacid *Heteroplax maldivensis* (Rathbun, 1902), the rarely reported portunid *Thalamita macrodonta* Borradaile, 1903, and the xanthid *Paraxanthodes cumatodes* (MacGilchrist, 1905), are also recorded from India for the first time.

Materials and methods

All specimens were collected during an exploratory survey (cruise 360) of FORV *Sagar Sampada* belonging to the Center for Marine Living Resources & Ecology (CMLRE) under the Ministry of Earth Sciences, India, in May 2017, conducted along the southwestern coast of India. Specimens were collected using grabs and dredged from depths ranging from 50–200 m. The material studied is in the museum collections of the Department of Aquatic Biology and Fisheries, University of Kerala (DABFUK).

Measurements provided are of the maximum carapace width and length, respectively. The classification and terminology used follows Ng et al. (2008) and Davie et al. (2015a, b). Complete synonymies are only provided for species which are treated at length.

Systematics

Family Raninidae De Haan, 1839

Notosceles Bourne, 1922

Notosceles serratifrons (Henderson, 1893)

Fig. 1A

Material examined. 2 males (9.1 × 17.6 mm, 9.0 × 17.5 mm), 8°19.972'N, 76°35.897'E, 100 m.

Remarks. Henderson (1893) described this species from Sri Lanka. It has since been found in India (Alcock 1896; Dev Roy 2013; Trivedi et al. 2018) as well as Australia, Japan, mainland China and Taiwan (Sakai 1976; Chen and Sun 2002; Ahyong et al. 2009).

Family Leucosiidae Samouelle, 1819

***Nursilia* Bell, 1855**

***Nursilia tonsor* Alcock, 1896**

Fig. 1B

Material examined. 1 young female (6.0×5.3 mm), $8^{\circ}22.727'N$, $76^{\circ}43.545'E$, 50 m.

Remarks. The species was first described from the Andaman Sea (Alcock 1896) and has since been reported from other parts of India, Southeast Asia, China, and Japan (Sakai 1976; Serène and Soh 1976; Tan 1996; Chen and Sun 2002; Dev Roy and Nandi 2012).

***Arcania* Leach, 1817**

***Arcania gracilis* Henderson, 1893**

Fig. 1C

Material examined. 1 juvenile male (7.7×5.5 mm), $7^{\circ}16.713'N$, $77^{\circ}37.582'E$, 200 m.

Remarks. The genus was revised by Galil (2001) who confirmed that the two Indian Ocean species, *Arcania quinquespinosa* Alcock & Anderson, 1894, and *A. gracilis* Henderson, 1893, are subjective synonyms. The species has a wide distribution in India and the Indo-West Pacific (see Galil 2001; Trivedi et al. 2018).

***Coleusia* Galil, 2006**

***Coleusia urania* (Herbst, 1801)**

Fig. 1D

Material examined. 1 juvenile female (10.1×12.0 mm), $7^{\circ}27.978'N$, $77^{\circ}32.297'E$, 100 m.

Remarks. The identity of this species and the confused status of the types were resolved by Ng et al. (2014). The species has a wide range in the Indo-West Pacific (see also Ng et al. 2014; Promdam et al. 2014).

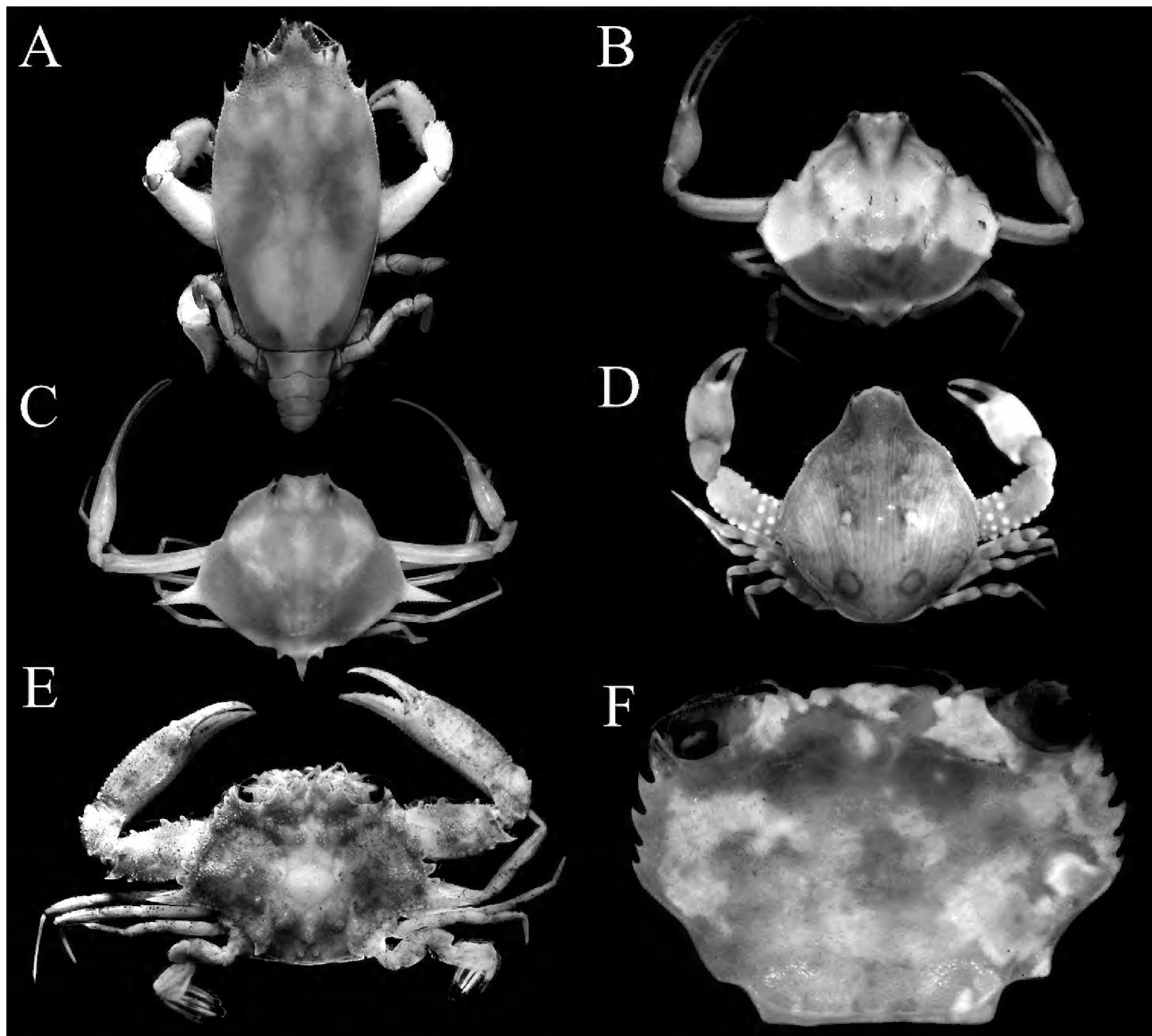


Figure 1. Overall dorsal habitus. **A** *Notosceles serratifrons* (Henderson, 1893), male (9.1×17.6 mm) **B** *Nursilia tonsor* Alcock, 1896, female (6.0×5.3 mm) **C** *Arcania gracilis* Henderson, 1893, male (7.7×5.5 mm) **D** *Coleusia urania* (Herbst, 1801), female (10.1×12.0 mm) **E** *Xiphonectes tuberculatus* (A. Milne-Edwards, 1861), male (21.1×12.4 mm) **F** *Thalamita macrodonta* Borradaile, 1902, female (8.4×5.8 mm).

Family Portunidae Rafinesque, 1815
***Xiphonectes* A. Milne-Edwards, 1873**

***Xiphonectes tuberculatus* (A. Milne-Edwards, 1861)**

Fig. 1E

Material examined. 1 male (21.1×12.4 mm), 1 female (18.6×10.1 mm), $7^{\circ}27.978'N$, $77^{\circ}32.297'E$, 200 m.

Remarks. This species was described from Hawaii but has since been reported from all across the Indo-West Pacific to Madagascar (A. Milne-Edwards 1861; Stephenson 1972a; Davie 1987). In India, it has previously been reported from Tamil Nadu and the Andaman Sea (Alcock 1894, 1899b; Dev Roy 2015; Dev Roy and Nandi 2007, 2012).

***Monomia* Gistel, 1848**

***Monomia argentata argentata* (A. Milne-Edwards, 1861)**

Material examined. 1 young male (18.2 × 10.2 mm), 8°58.270'N, 76°17.365'E, 50 m.

Remarks. This is a well-known and widely distributed species in the Indo-West Pacific (Stephenson 1972b; Apel and Spiridonov 1998); and is found in most states in India (Trivedi et al. 2018).

***Thalamita* Latreille, 1829**

***Thalamita macrodonta* Borradaile, 1902**

Fig. 1F

Material examined. 1 young female (8.4 × 5.8 mm), 8°22.727'N, 76°43.545'E, 50 m.

Remarks. Borradaile (1902) described *Thalamita exetastica macrodonta* from two specimens from two islands in the Maldives, Kolumadulu and Suvadiva. Crosnier (1975) examined the syntypes and commented that the two specimens are not conspecific. He noted that the specimen from Kolumadulu Island was almost certainly *T. sexlobata* Miers, 1886, while the other from Suvadiva Island is the actual *T. macrodonta* which he treated as a distinct species. Apel and Spiridonov (1998) re-examined the type material and selected the second syntype from Suvadiva as the lectotype of *T. macrodonta* s. str.

The present specimen from India is incomplete and not in good condition, but agrees with the description and figures of *T. macrodonta* by Crosnier (1975: fig. 4c, d) and Apel and Spiridonov (1998: fig. 59).

Family Euryplacidae Stimpson, 1871

***Nectopanope* Wood-Mason in Wood-Mason & Alcock, 1891**

Nectopanope Anonymous, 1891: 56 (nomen nudum).

Nectopanope Wood-Mason in Wood in Wood-Mason & Alcock, 1891: 261.

Diagnosis. Carapace (Fig. 3A, B) subhexagonal, wider than long, dorsal surface smooth, regions poorly indicated; front (Fig. 3C–E) wide, straight with small median notch, with transverse sulcus along margin. Anterolateral borders (Fig. 3A, B) convex; with two low teeth posterior to broadly triangular outer orbital angle, first tooth wider than acute second tooth. Orbita (Fig. 3C–E) wide, spherical, deep; supraorbital margin with submedian notch, small acute lobe before notch with front; low suborbital tooth on broad, suborbital border; eye peduncles short, stout, with large subreniform (dorsoventrally flattened) cornea (Fig. 3D, E). Basal antennal article mobile, completely closing orbital

hiatus (Fig. 3D). Ischium of third maxilliped (Fig. 3B) elongate; anteroexternal margin of merus auriculiform. Cheliped fingers (Figs 3A, G, 4E, F) stout, as long as propodus, not pigmented; carpus with small, sharp spine on inner margin, merus with acute anterodorsal tooth. Dorsal margins of ambulatory legs (P2–P5) (Figs 3A, 4G–J) meri, carpi, propodi unarmed, dactyli slender, smooth, setose; P5 propodus, dactylus proportionally short, flattened, fringed with many short setae. Thoracic sternum (Fig. 4A, D) relatively wide; sternites 1, 2 completely fused; suture 2/3 complete, gently convex towards buccal cavity; sternites 3, 4 medially fused, with shallow median groove, almost indiscernible with only lateral notch distinct; sutures 4/5, 6/7, 7/8 medially interrupted, 5/6 complete; median groove on thoracic sternites 7, 8. Male sternopleonal cavity (Fig. 4A, D) deep, reaching median part of sternite 4, just before sternite 3. Press-button of male pleonal-locking mechanism (Fig. 4D) present as low tubercle on sternite 5, near thoracic suture 4/5. Male pleon (Fig. 4A–C) narrow, slender, T-shaped, lateral margins of somites 4–6 abruptly narrowing from somite 3 to transversely narrow, acutely triangular telson (Fig. 4B); somite 3 wide, reaching inner margins of P5 coxae; no part of thoracic sternite 8 exposed by closed pleon, somite 2 transversely shorter than somite 3, somite 1 (Fig. 4C) conspicuous, narrow. G1 (Fig. 7A–D) long, slender, almost straight; distal quarter distinctly chitinised; apex sharp, distal third with numerous sharp denticles. G2 (Fig. 7E) less than one-third G1 length, relatively straight, apex spatuliform. Male genital opening (gonopore) coxal; penis long. Female characters not known.

Remarks. The type species of *Nectopanope* has been somewhat confused. Only one species, *Nectopanope longipes*, was recognised in Anonymous (1891: 56) but both these names are nomina nuda. Wood-Mason (in Wood-Mason and Alcock 1891: 261, 262) provided valid descriptions for the genus and species, and included *N. rhodobaphes* as a second species. Ng et al. (2008: 80) noted that the type species of *Nectopanope* was *N. rhodobaphes* by monotypy, but this is not correct. Although Wood-Mason (in Wood-Mason and Alcock 1891) did not explicitly state which was the type species for *Nectopanope* Wood-Mason in Wood-Mason & Alcock, 1891, they wrote “*Nectopanope rhodobaphes*, gen. et sp. n., Wood-Mason” (Wood-Mason in Wood-Mason and Alcock 1891: 261). Under Article 68.2.1 of the Code (ICZN 1999), this is sufficient to recognise it as the type species of the genus (see Huys et al. 2014: 27). Alcock (1898: 213) later commented that *Nectopanope* should be restricted to *N. rhodobaphes* and that “*Nectopanope longipes*, which was provisionally referred to this genus by Wood-Mason, who had insufficient material for examination, turns out, now that numerous good specimens have been dredged by the ‘Investigator,’ to be a Catometope belonging to the genus *Carcinoplax*.” Alcock (1899a: 64) repeated the same comments in his treatment of the deep-sea Crustacea of the Indian Seas. *Nectopanope longipes* Wood-Mason in Wood-Mason & Alcock, 1891, is now generally regarded as a valid species in *Carcinoplax* H. Milne Edwards, 1853 (Goneplacidae MacLeay, 1838) (see Castro 2007).

Nectopanope Wood-Mason in Wood-Mason & Alcock, 1891, was originally placed in Cancridae Latreille, 1802, by Wood-Mason (in Wood-Mason and Alcock 1891) with Alcock (1898, 1899a) later transferring the genus to Xanthidae s. lato. Alcock (1898) recognized a new group in his xanthid subfamily Pilumninae, Heteropanopioidea

Alcock, 1898, in which he included *Heteropanope* Stimpson, 1858, *Eurycarcinus* A. Milne-Edwards, 1867, and *Nectopanope*. Ng et al. (2008: 204) transferred *Nectopanope* to Xanthinae (Xanthidae) without explanation. This was necessary as *Heteropanope* and *Eurycarcinus* had already been moved to the Pilumnidae (present Pilumnoidea) by then (see Ng et al. 2018).

The family position of *Nectopanope* is difficult because its only species, *N. rho-dobaphes*, has previously only been known from one female specimen. Wood-Mason (in Wood-Mason and Alcock 1891: 262) noted that he had “one specimen obtained at Station 96, 98 to 102 fathoms; the length of its carapace is 21.4 millim., and the greatest breadth between the points of the third teeth 29 millim.” Station 96 was in the Bay of Bengal, 18°30'N, 84°46'E, substrate is sand at a depth of 98–102 fathoms, and dated 4 March 1890 (Anonymous 1914). The sex of the specimen was not stated. Alcock (1899a: pl. 38 fig. 6) figured the specimen but it is not clear what its sex was (Fig. 2). Alcock (1898: 213; 1899a: 65) noted that they only had one female collected from the Godávari coast (in the Bay of Bengal) from 98–102 fathoms, that is the type. A search in the Zoological Survey of India in Calcutta for this specimen was not successful and it could not be located (S. Mitra, personal communication).

The study of the present male specimen resolves the systematic position of *Nectopanope*. The structures of the male pleon and gonopods leave no doubt that *Nectopanope* is in fact a member of Euryplacidae Stimpson, 1871. *Nectopanope* is only superficially resembles *Eurycarcinus* (and the Pilumnidae) due to similar carapace features. Their male pleons and gonopods, however, are completely different (cf. Ng et al. 2018).

In Euryplacidae, the general shape and structure of the carapace as well as smoothness of the surfaces of *Nectopanope* most closely resembles *Psopheticoides* Sakai, 1969 (with only one species, *P. sanguineus* Sakai, 1969), from the western Pacific. They also share a similar eye morphology. The eye of *Psopheticoides* is large and is distinctly flattened dorsoventrally, with the structure appearing reniform (Castro and Ng 2010: fig. 36B). The eye of *Nectopanope* is relatively less distinctly flattened dorsoventrally and only weakly reniform in shape (Fig. 3D, E). No other euryplacids, however, have such a distinct eye structure which has been reported in other deep-sea brachyurans (e.g., *Hexaplex* Doflein, 1904, Hexapodidae; cf. Rahayu and Ng 2014).

The carapace anterolateral margin of *Nectopanope* has three distinct teeth (Figs 2, 3A, C) (with only two teeth in *Psopheticoides*, with the external orbital tooth very broad; Sakai 1969: text-fig. 16b; Sakai 1976: pl. 192, fig. 3). The external orbital tooth of *Psopheticoides*, however, is usually partially medially indented, and although the cleft is not deep, it gives the appearance of having three teeth on the anterolateral margin (cf. Sakai 1969: text-figs 16b, 18b; Sakai 1976: text-fig. 282a; Castro and Ng 2010: fig. 36A). The frontal margin in *Nectopanope* is medially indented (Figs 2, 3A, C) (margin entire in *Psopheticoides*; cf. Castro and Ng 2010: fig. 36A); the ischium of the third maxilliped is proportionately longer with the auriculiform anteroexternal angle of the merus more developed (Fig. 3B) (ischium of third maxilliped relatively shorter and the anterexternal angle of the merus less produced in *Psopheticoides*; cf. Castro and Ng 2010: fig. 36C); the cornea is weakly reniform (Fig. 3D, E) (cornea prominently reniform in *Psopheticoides*;

cf. Castro and Ng 2010: fig. 36B); the male telson is proportionately shorter (Fig. 4A) (elongated and linguiform in *Psopheticoides*; cf. Castro and Ng 2010: fig. 36E); and the G1 is relatively straighter with the tip tapered to a tip (Fig. 7A–D) (G1 slightly sinuous with the tip arrow-shaped in *Psopheticoides*; cf. Castro and Ng 2010: fig. 38D, E).

***Nectopanope rhodobaphes* Wood-Mason in Wood-Mason & Alcock, 1891**

Figs 2–4, 7A–E

Nectopanope rhodobaphes Wood-Mason in Wood-Mason & Alcock, 1891: 261; Alcock 1899a: pl. 38 fig. 6; Ng et al. 2008: 204 (list); Huys et al. 2014: 15, 27 (discussion).

Material examined. 1 male (18.4 × 14.7 mm), 7°27.978'N, 77°32.297'E, 200 m.

Diagnosis. As for genus.

Description. Carapace (Figs 2, 3A, C) transversely subhexagonal, 1.25 times wider than long; dorsal surface distinctly convex, smooth, without setae or granules; regions poorly defined, epigastric region not indicated, gastro-cardiac groove shallow. Front (Fig. 3A, C) lamellar, almost straight, smooth, with shallow median notch; postorbital region smooth, without trace of crest; front separated from supraorbital margin by small but distinct right-angled notch; lateral lobe triangular, small. Anterolateral margin (Fig. 3A, C) convex with three teeth including external orbital angle; external orbital angle broadly triangular, subtruncate; first lateral tooth triangular, tip directed anteriorly, separated from other teeth by deep-V-shaped notch, margin gently convex and entire to uneven; second lateral tooth acutely triangular, directed obliquely laterally. Posterolateral margin (Fig. 3A, C) gently convex, converging gradually towards gently convex posterior carapace margin. Suborbital, subhepatic, anterior half of pterygostomial regions (Fig. 3D) smooth. Orbita (Fig. 3D, E) wide, spherical, deep; supraorbital margin concave, smooth with distinct submedian fissure, gradually merging with external orbital tooth; suborbital tooth lined with small granules, with broad low tooth on inner edge, adjacent to antenna. Eye peduncles short, stout, with large subreniform (dorsoventrally flattened) cornea (Fig. 3D, E). Basal antennal article (articles 2 and 3) (Fig. 3D, G) rectangular, longer than broad, mobile, completely closing orbital hiatus. Basal antennular article subrectangular; flagellum long, folding transversely. Epistome (Fig. 3D, F) longitudinally narrow; posterior margin of epistome with prominent subtruncate median projection, with distinct longitudinal fissure; lateral margin almost straight, separated from median part by fissure. Endostomial ridge distinct, long.

Third maxillipeds (Fig. 3B) almost completely closing buccal cavern when closed; merus subquadrate, anteroexternal margin strongly auriculiform; ischium subrectangular, elongated, with submedian oblique sulcus, inner margin serrated, lined with dense stiff setae; exopod stout with prominent subdistal triangular tooth on inner margin, flagellum long, extending past width of merus.

Chelipeds (P1) (Figs 3A, G, 4E, F) unequal, right chela slightly larger; fingers slender, as long as palm; dorsal margin of palm rounded; distal half of chela with ventral margin

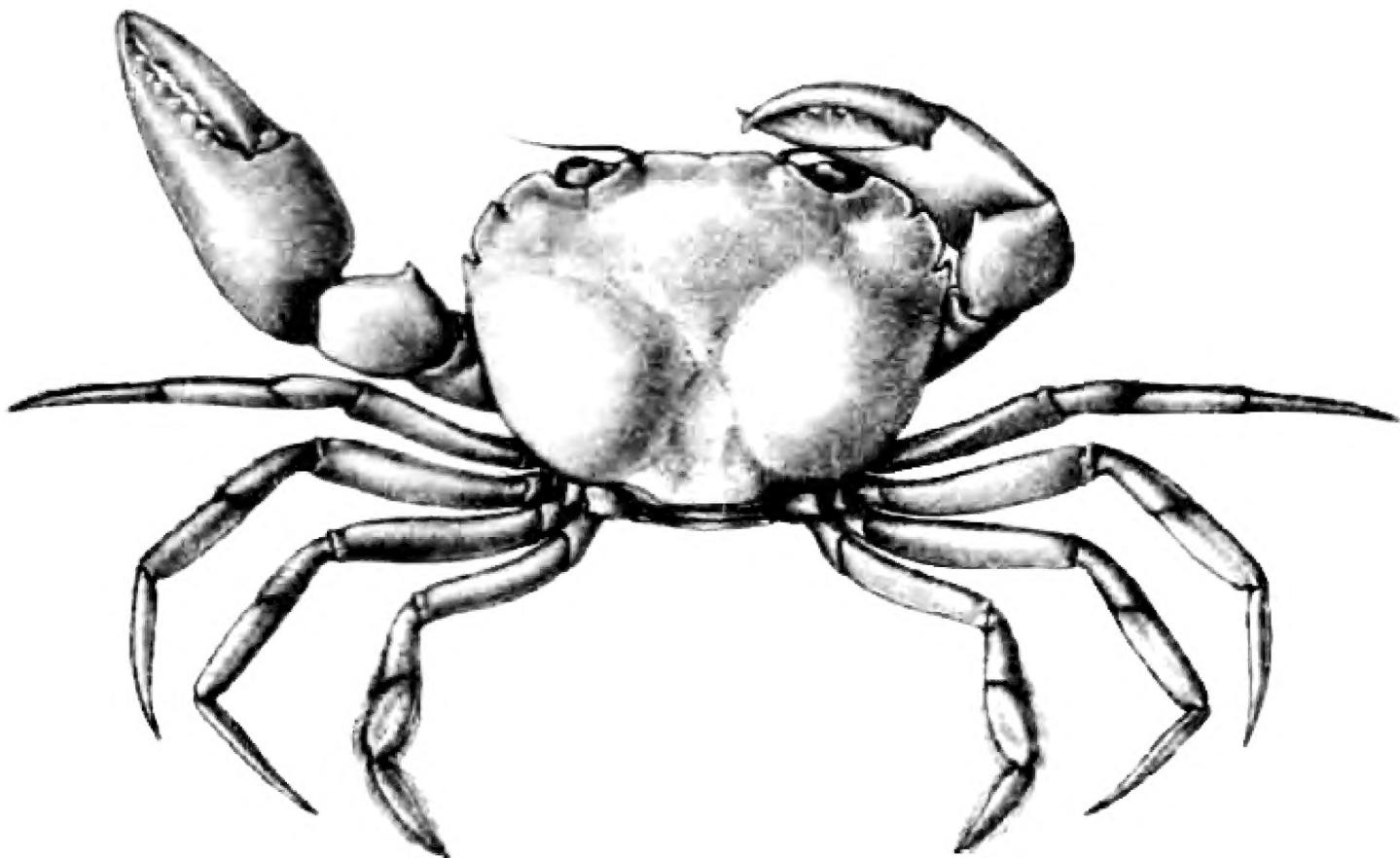


Figure 2. *Nectopanope rhodobaphes* Wood-Mason in Wood-Mason & Alcock, 1891 (after Alcock 1899a: pl. 38 fig. 6).

(including entire pollex) possessing distinct subventral longitudinal sulcus, forming sub-cristiform ventral margin; outer surface of palm smooth; inner surface smooth with gently convex median part, ventro-proximal part with low lobiform rounded projection; cutting edge of pollex of major chela with prominent large triangular teeth; dactylus gently curved with 2 shallow longitudinal median sulci on outer margin (upper one deeper), cutting edge with large triangular teeth; fingers of minor chela similar to those on major chela.

Ambulatory legs (P2–P5) (Figs 3A, 4G–J) moderately long, slender; P3 longest; P2–P5 merus subcylindrical, slightly flattened laterally, outer surface smooth, glabrous, ventral margin smooth, dorsal margin almost entire; P5 merus gently up-curved; P2–P5 carpus short, outer surface glabrous, dorsal margin smooth; P2–P4 propodus of long, laterally flattened, with distinct shallow longitudinal median sulcus, lateral margins of distal third almost completely glabrous; P5 propodus ovate, laterally flattened, with distinct setae lining margins which partially obscure margin; P2–P4 dactylus elongated, falciform, smooth; P5 shortest, subspatuliform, margins lined with short setae; dactylo-propodal lock not distinct.

Thoracic sternum (Figs 4A, D) relatively wide, surface relatively smooth but with shallow uneven pits; sternites 1, 2 completely fused, distinctly triangular, lateral margins gently concave, separated from sternite 3 by distinct gently convex suture (towards buccal cavity); sternites 3, 4 fused with only lateral part of suture clearly visible, median part indicated by barely discernible shallow broad groove; sutures 4/5, 5/6, 7/8 medially interrupted, suture 6/7 almost complete, separated by very narrow gap; distinct median longitudinal groove extending across sternites 7, 8. Posterior edge of episternite 7 par-

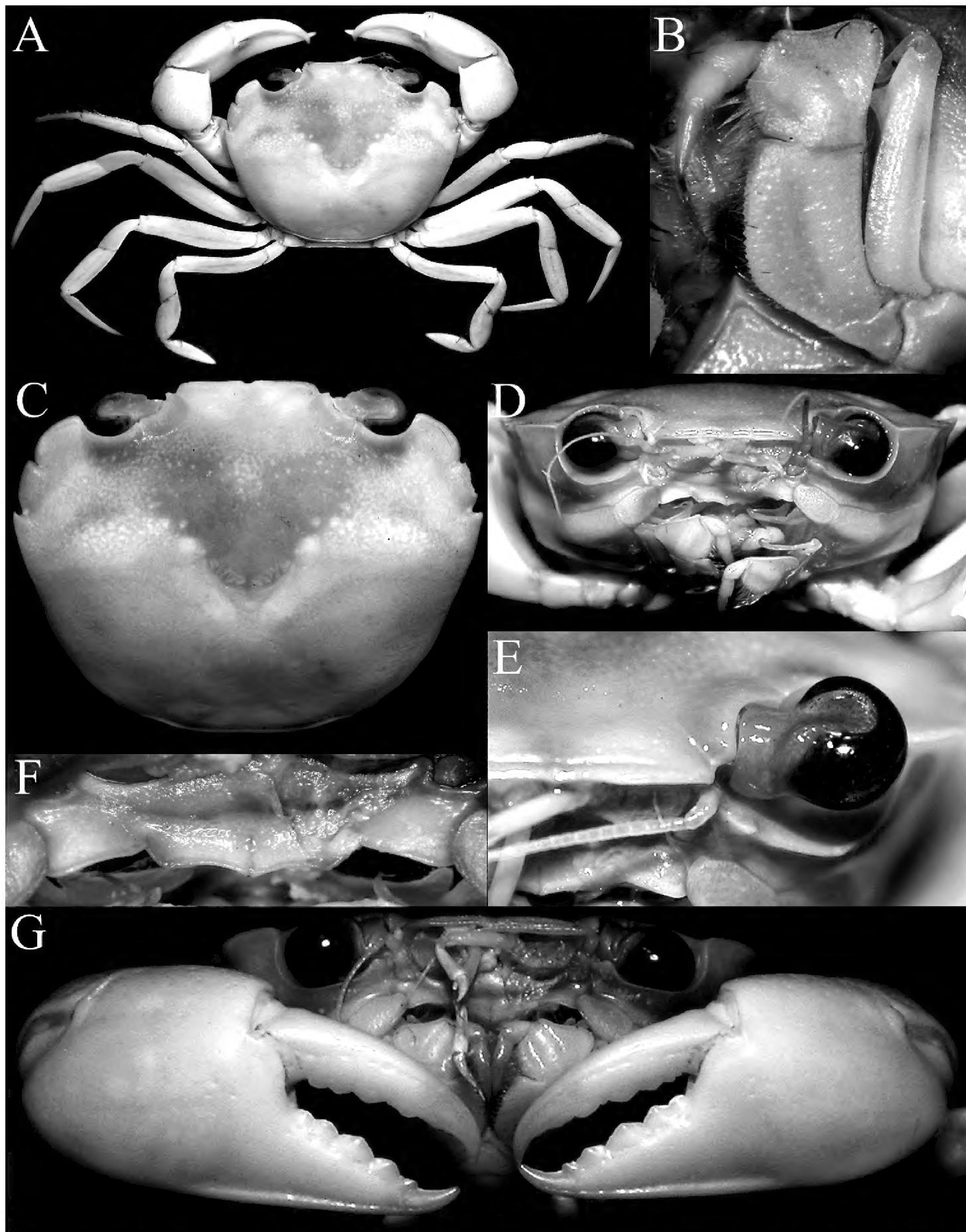


Figure 3. *Nectopanope rhodobaphes* Wood-Mason in Wood-Mason & Alcock, 1891, male (18.4 × 14.7 mm), India. **A** overall dorsal habitus **B** left third maxilliped **C** dorsal view of carapace **D** frontal view of cephalothorax **E** closeup of eye **F** epistome **G** outer view of chelae.

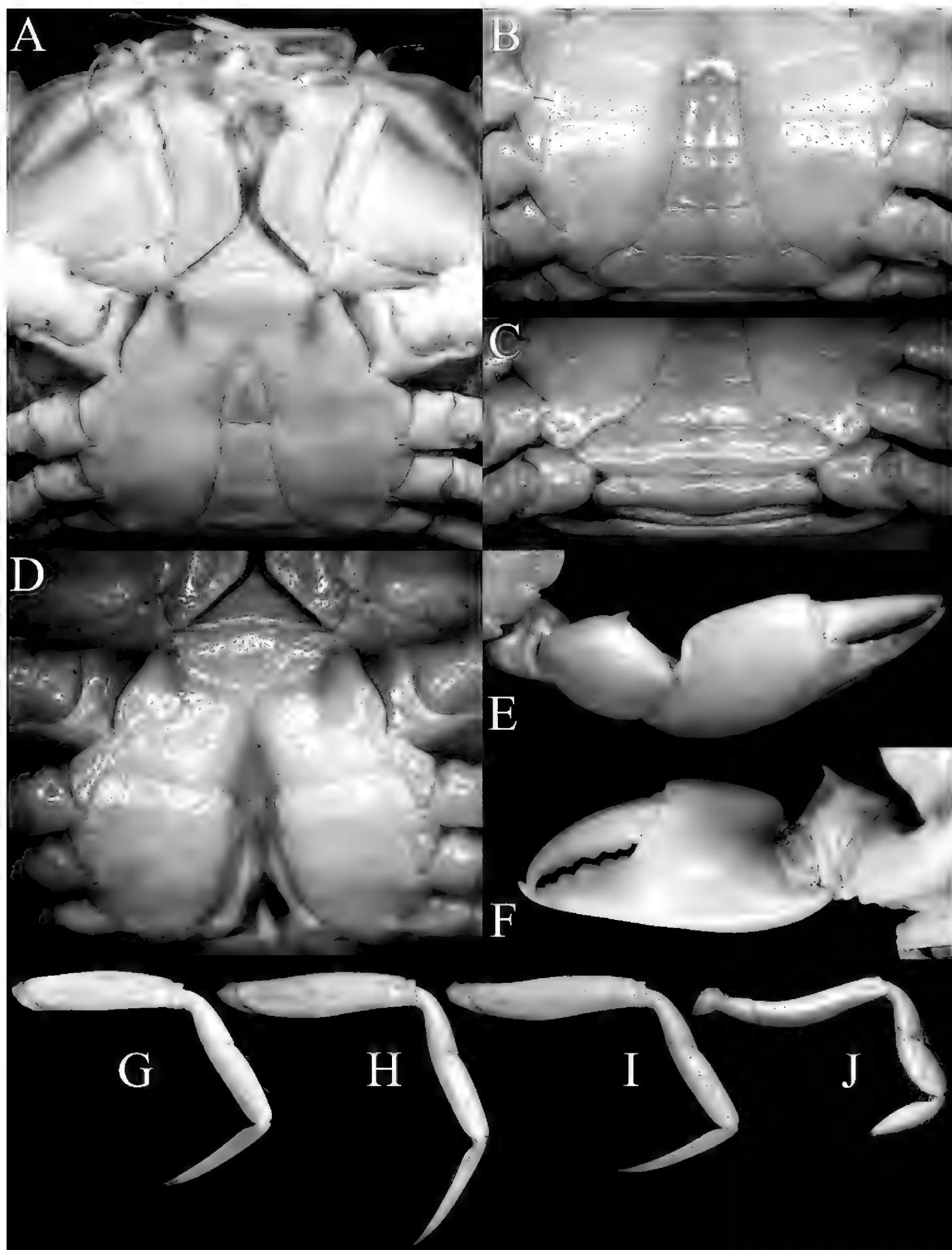


Figure 4. *Nectopanope rhodobaphes* Wood-Mason in Wood-Mason & Alcock, 1891, male (18.4 × 14.7 mm), India. **A** anterior thoracic sternum, pleon, buccal cavity and third maxillipeds **B** thoracic sternum and pleon **C** posterior thoracic sternum and pleon **D** anterior thoracic sternum and sternopleonal cavity **E** subdorsal view of right cheliped **F** inner view of right cheliped **G–J** second to fourth ambulatory legs, respectively (all to same scale).

tially overlapping anterior part of P5 coxa and partially covering anterolateral part of pleonal somite 3 when closed. Sternopleonal cavity (Fig. 4A, D) deep, reaching nearly to anterior edge of sternite 4, just before sternite 3, defined by imaginary line connecting midpoint of coxae of chelipeds; pleon (Fig. 4C) completely covering sternite 8 when closed. Press-button of male pleonal locking mechanism (Fig. 4D) present as short spur-like structure on anterior quarter of sternite 5, just adjacent to sternite 4. Opening for penis coxal, penis relatively short, tubular, exiting at anterior edge of condyle of P5 coxa.

Pleon (Fig. 4A–C) narrow, slender, distinctly T-shaped; somites 3–6 trapezoidal, abruptly narrowing from somite 3–6; telson acutely triangular with convex lateral margins; somite 3 wide, reaching inner margins of P5 coxae; no part of thoracic sternite 8 exposed by closed pleon; somite 2 transversely shorter than somite 3 but reaching P5; somite 1 conspicuous, narrow, almost as wide as somite 2.

G1 (Fig. 7A–D) long, slender, almost straight; distal quarter distinctly chitinised, stiff; apex sharp, distal third with numerous sharp denticles, longer in some specimens than in others. G2 (Fig. 7E) less than one-third G1 length, relatively straight, apex spatuliform.

Remarks. The colour of the fresh type specimen was described as “a beautiful deep-sea pink, with a dotted, V-shaped, white mark between the gastric and branchial regions.” (Wood-Mason in Wood-Mason and Alcock 1891: 262). The present preserved specimen, although faded, retains enough colour to suggest that in life, it had the colour and pattern described in the original description. This colour is somewhat similar to that known for *Psopheticoides sanguineus* which is red to pinkish-red all over but with a white ring on the median dorsal surface (Sakai 1976: pl. 192, fig. 3; Castro and Ng 2010: fig. 39C).

The type female (Fig. 2) shows the branchial regions distinctly swollen but this is probably due to parasites, although the specimen was not dissected. This has precedence in the Australian euryplacid *Eucrate sexdentata* Haswell, 1882, in which one specimen has both sides of the branchial regions swollen and infected by bopyrids (cf. Castro and Ng 2010: fig. 10E).

Henicoplax Castro & Ng, 2010

Henicoplax maldivensis (Rathbun, 1902)

Figs 5, 7F–H

Goneplax maldivensis Rathbun, 1902: 124, figs 3–5; Guinot 1969: 518; Castro 2007: 686, 687 [list].

“?[*Goneplax*] *maldivensis*”: Guinot 1971: 1081 [list].

Otmaroplax maldivensis: Števčić 2005: 134 [genus name nomen nudum]

“*Heteroplax*” *maldivensis*: Ng et al. 2008: 78, 79 [in list].

Henicoplax maldivensis: Castro and Ng 2010: 61, figs 22A–E, 24D–F.

Material examined. 1 male (9.9 × 6.3 mm), 7°27.978'N, 77°32.297'E, 100 m.

Remarks. *Henicoplax* Castro & Ng, 2010, was established for Indo-West Pacific species that had been previously classified in *Goneplax* Leach, 1814, or *Heteroplax*

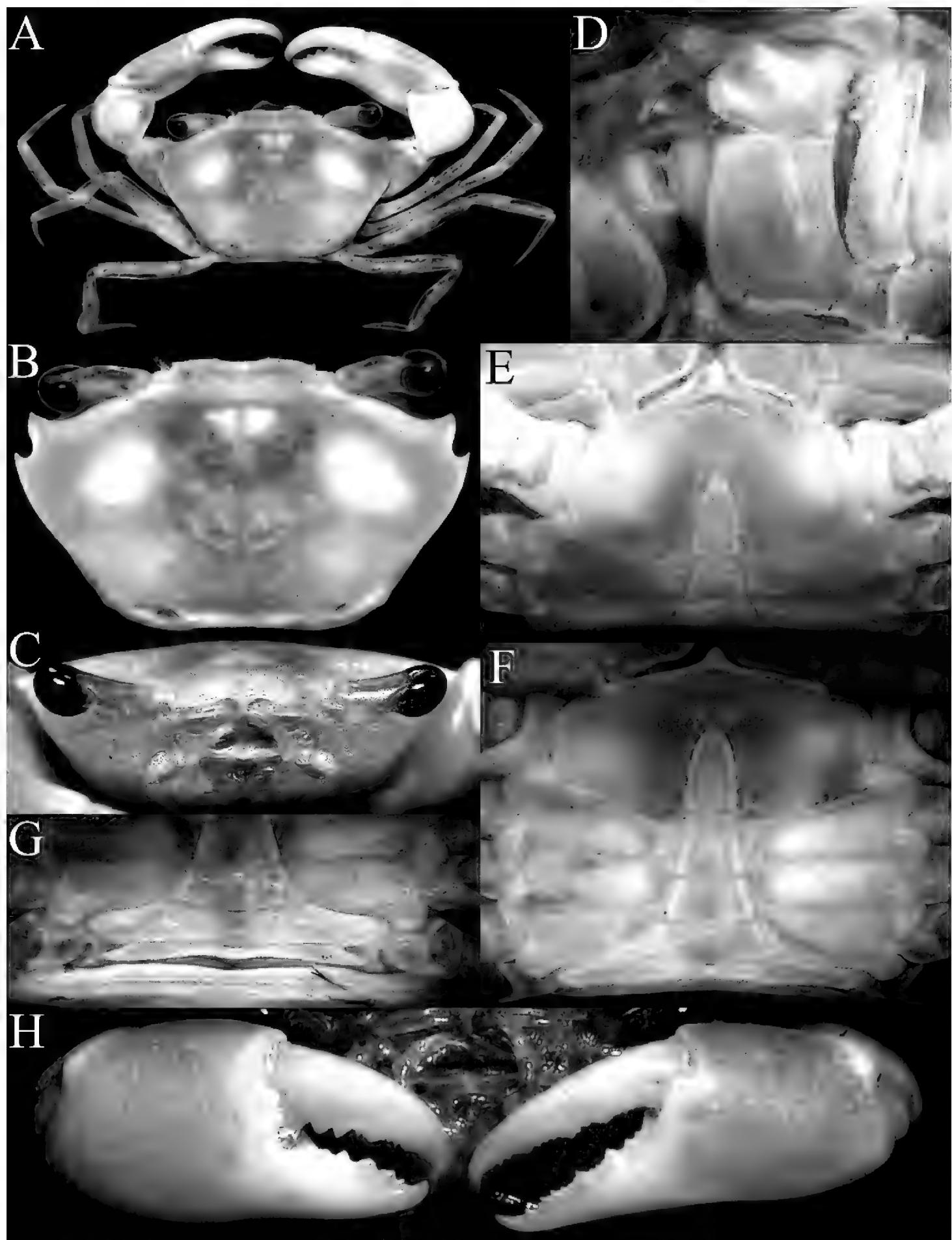


Figure 5. *Henicoplax maldivensis* (Rathbun, 1902), male (9.9 × 6.3 mm), India. **A** overall dorsal habitus **B** dorsal view of carapace **C** frontal view of cephalothorax **D** left third maxilliped **E** anterior thoracic sternum and pleon **F** thoracic sternum and pleon **G** posterior thoracic sternum and pleon **H** outer view of chelae.

Stimpson, 1858. Five species are currently recognised: *H. eriochir* Castro & Ng, 2010, *H. maldivensis* (Rathbun, 1902) [type species], *H. nitida* (Miers, 1879a), *H. pilimeles* Castro & Ng, 2010, and *H. trachydactylus* Castro & Ng, 2010.

The present specimen is clearly *H. maldivensis* as redescribed and figured at length by Castro and Ng (2010: 61). The species was previously known only from the holotype male (7.4×4.8 mm) obtained from Gan Island in Addu Atoll in the Maldives. The present male differs from the type male in having the frontal margin slightly more sinuous and the cleft between the external orbital tooth and the anterolateral tooth is more U-shaped (Fig. 5A, B) (versus frontal margin almost straight and the lateral carapace cleft being V-shaped in the holotype; cf. Castro and Ng 2010: fig. 22A); and while the G1 shape is similar, the distal spination is relatively less pronounced and the tip is sharply tapering (Fig. 7F, G) (versus distal half with relatively more spines and the tip is subtruncate in the holotype; cf. Castro and Ng 2010: fig. 24D, E). The differences are not substantial and can easily be explained by variation and size, the present male (9.9×6.3 mm) being larger than the type (7.4×4.8 mm).

Castro and Ng (2010) showed that records of “*H. nitida*” from the Andaman Sea should be referred to a new species, *H. pilimenes*; and indicated that true *H. nitida* should be restricted to East Asia. The records of “*H. nitida*” from the Gulf of Martaban (south of Myanmar) and off Madras in India by Henderson (1893: 379) are almost certainly not this species. The Myanmar material is probably *H. pilimenes*, while that from India may be this species or even *H. maldivensis* instead. Specimens will need to be re-examined to be certain.

Heteroplax maldivensis is thus far known for certain only from the Maldives (Rathbun 1902; Castro and Ng 2010) and the present specimen represents the first confirmed presence of this species in India.

Family Parthenopidae Macleay, 1838

Pseudolambrus Paulson, 1875

Pseudolambrus beaumonti (Alcock, 1895)

Fig. 6A

Material examined. 1 female (9.4×8.8 mm), $7^{\circ}48.004'N$, $77^{\circ}27.754'E$, 50 m.

Remarks. This species was described from off Sri Lanka and Andamans by Alcock (1895) and has since been reported from Mauritius and Japan (Flipse 1930; Michel 1964; Sakai 1976). Ng and Rahayu (2010) figured the syntypes of the species.

Rhinolambrus A. Milne-Edwards, 1878

Rhinolambrus contrarius (Herbst, 1804)

Fig. 6B

Material examined. 1 young female (10.5×10.0 mm), 3 juveniles (largest 6.8×6.8 mm), $7^{\circ}48.004'N$, $77^{\circ}27.754'E$, 50 m.

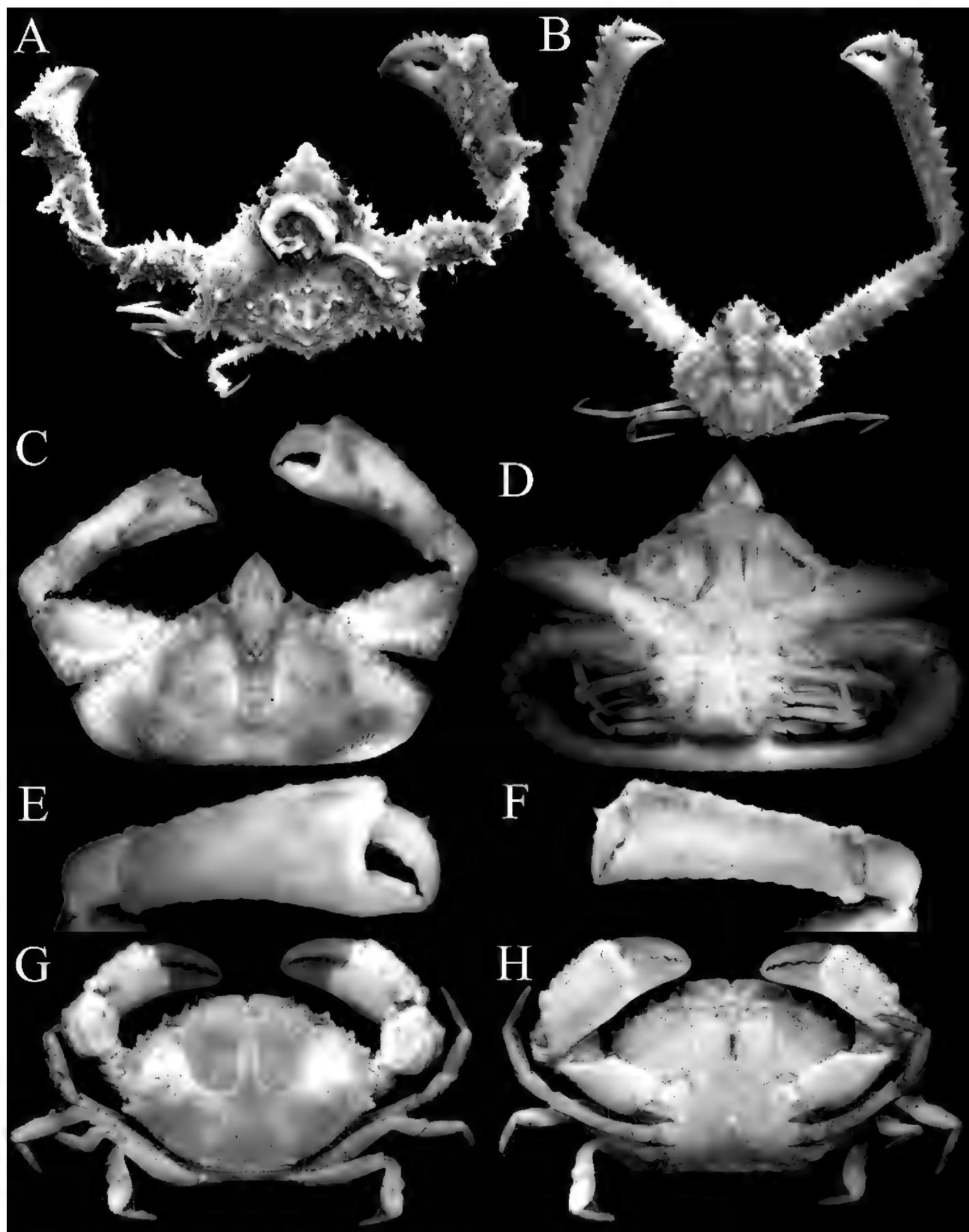


Figure 6. **A** *Pseudolambrus beaumonti* (Alcock, 1895), female (9.4×8.8 mm) **B** *Rhinolambrus contrarius* (Herbst, 1804), female (10.5×10.0 mm) **C-F** *Cryptopodia collaris* Flipse, 1930, male (17.5×10.6 mm) **G, H** *Paraxanthodes cumatodes* (MacGilchrist, 1905), male (8.3×5.5 mm). **A, B, C, G, H** overall dorsal habitus **D** ventral view of cephalothorax **E, F** outer view of chelae.

Remarks. Herbst (1804: 9) described this species from material from somewhere in the “East Indies” and as far as is known, the type is lost (Sakai 1999). This is the type species of *Rhinolambrus* A. Milne-Edwards, 1878. The species has a wide

Indo-West Pacific distribution (see Flipse 1930; Sakai 1976); and in India has been reported from various parts of Tamil Nadu and Andamans (Henderson 1893; Jeyabaskaran et al. 2000; Kathirvel and Gokul 2010; Dev Roy and Nandi 2012; Vidhya et al. 2017).

The present materials are all juveniles, with none of the gonopod structures of the males developed even though the chelipeds are elongated. The pronounced “neck-like” constriction in adults of this species has still not developed (Fig. 6B).

Cryptopodia H. Milne Edwards, 1834

Cryptopodia collifer Flipse, 1930

Figs 6D–F, 7I–M

Cryptopodia collifer Flipse, 1930: 66, fig. 41; Serène 1968: 62 (list); Shen et al. 1982: 144, pl. 1 fig. 8; Dai et al. 1986: 160, pl. 21 fig. 8, text-fig. 91; Dai and Yang 1991: 176, pl. 21 fig. 8, text-fig. 91; Cai et al. 1994: 584 (list); Chiong and Ng 1998: 189, fig. 22; Davie et al. 2002: 322 (list); Ng and Davie 2002: 372 (list); Ng et al. 2008: 130 (list).

Material examined. 1 male (17.5 × 10.6 mm), 7°27.978'N, 77°32.297'E, 100 m.

Remarks. Five species of *Cryptopodia* H. Milne Edwards, 1834, are known from India (Trivedi et al. 2018): *C. angulata* H. Milne Edwards & Lucas, 1841, *C. echinosa* Chiong & Ng, 1998, *C. fornicata* (Fabricius, 1787), *C. patula* Chiong & Ng, 1998, and *C. spatulifrons* Miers, 1879b. The addition of *C. collifer* Flipse, 1930, not previously known from the Indian Ocean, is notable. *Cryptopodia collifer* Flipse, 1930, was described from a single female specimen from eastern Indonesia and has since been reported from China (Shen et al. 1982). In an unpublished study, S.H. Tan and the first author examined specimen of this species from off Phuket, Philippines and Fiji, including males, and they agree well with the specimen obtained here from India, and as figured by Chiong and Ng (1998: fig. 22).

The lateral margins of the rostrum are straight in the holotype of *C. collifer* (cf. Chiong and Ng 1998: fig. 22A) but are gently convex in the present male (Fig. 6C), as was figured by Shen et al. (1982: pl. 1 fig. 8) for the Chinese specimen. The male telson of *C. collifer* is semi-circular in shape (Fig. 6D), and is distinct from the more triangular shapes of other *Cryptopodia* species (see Chiong and Ng 1998). The G1 structure of *C. collifer* is most similar to that of *C. pan* Laurie, 1906, from the Indo-West Pacific (cf. Chiong and Ng 1998: fig. 24A, B, D–K), but the latter species is easily distinguished by its third maxilliped being distinctly swollen (Chiong and Ng 1998: fig. 23C). The third maxilliped of *C. collifer*, like those of other congeners, is quadrate and not inflated (Fig. 6D).

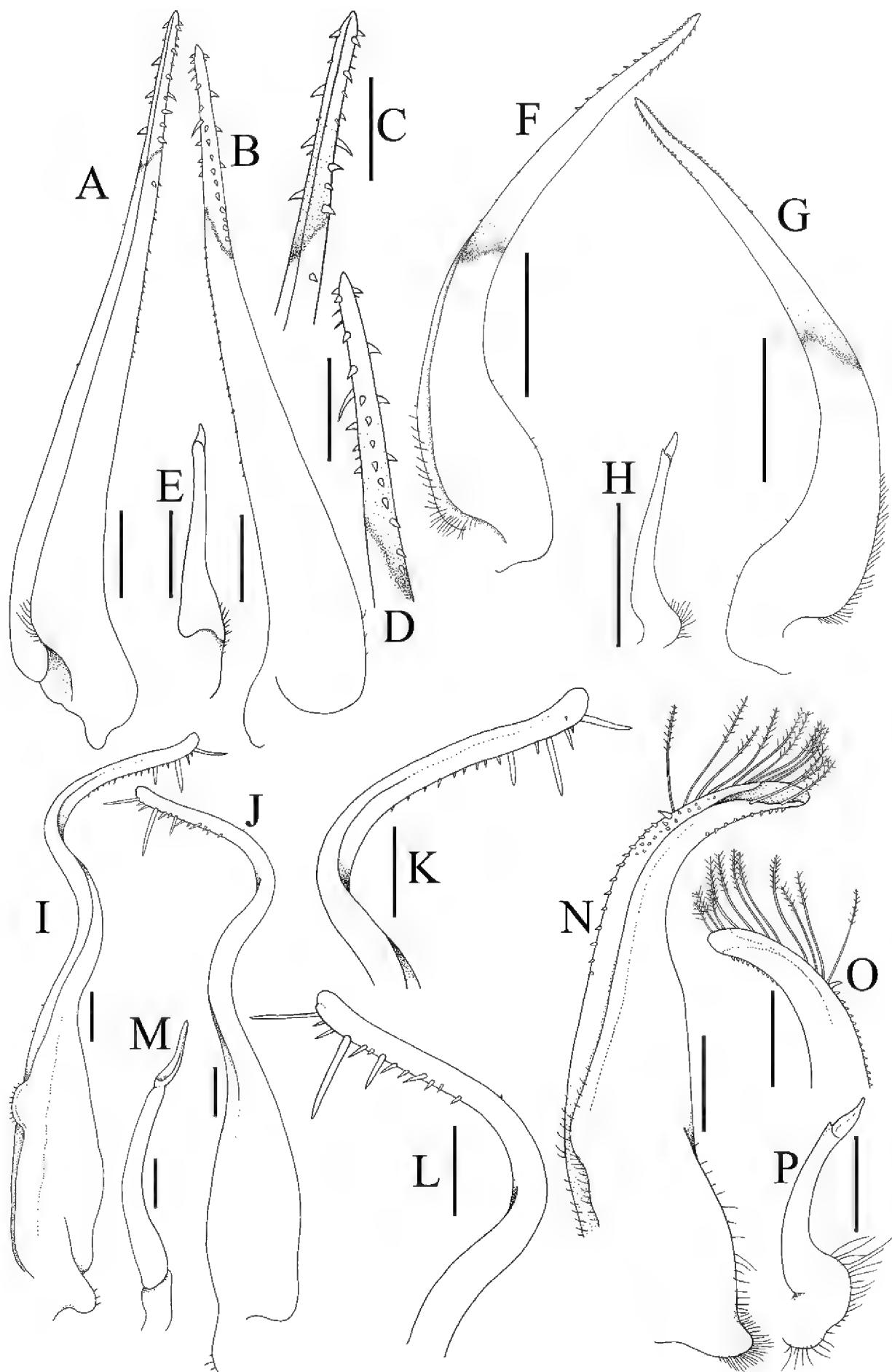


Figure 7. Gonopods. **A–E** *Nectopanope rhodobaphes* Wood-Mason in Wood-Mason & Alcock, 1891, male (18.4×14.7 mm) **F–H** *Henicoplax maldivensis* (Rathbun, 1902), male (9.9×6.3 mm) **I–M** *Cryptopodia collaris* Flipse, 1930, male (17.5×10.6 mm) **N–P** *Paraxanthodes cumatodes* (MacGilchrist, 1905), male (8.3×5.5 mm). **A, F** left G1 (ventral view) **B, G** left G1 (dorsal view) **C** distal part of left G1 (ventral view) **D** distal part of left G1 (dorsal view); left G2. Scales bars: 0.5 mm (**A, B, E–H–P**); 0.25 mm (**C, D**).

Family Xanthidae Macleay, 1838***Paraxanthodes* Guinot, 1968*****Paraxanthodes cumatodes* (MacGilchrist, 1905)**

Figs 6G, H, 7N–P

Xanthodes cumatodes MacGilchrist, 1905: 205; Alcock et al. 1907: pl. 79 fig. 1, 1A.

Xanthias cumatodes: Balss 1929: 24; Stephensen 1946: 148.

Paraxanthodes cumatodes: Guinot 1968: 723, fig. 60; Guinot 1971: 1069; Serène 1968: 77; Serène 1984: 209, pl. 30 fig. C; Ng et al. 2008: 204 (list); Mendoza et al. 2012: 3, fig. 1D–F, 2E–I.

Material examined. 1 male (8.3 × 5.5 mm), 8°58.270'N, 76°17.365'E, 50 m.

Remarks. The taxonomic problems associated with *Paraxanthodes* Guinot, 1968, and the allied genera *Monodaeus* Guinot, 1967, and *Medaeops* Guinot, 1967, and *Takedax* Mendoza & Ng, 2012, as well the generic affinities of species previously classified in these taxa have been discussed at length by Lai et al. (2011) and Mendoza and Ng (2012). While the genera are distinct at the genetic level, the available morphological characters are not always reliable; and work is still ongoing to clarify their affinities. Mendoza et al. (2012) discussed the generic position of *P. cumatodes*, and suggested that it may not be congeneric with *P. obtusidens* (Sakai, 1965), the type species of *Paraxanthodes*.

We refer the present specimen to *P. cumatodes*, described from the western Indian Ocean by MacGilchrist (1905), with doubt because of its relatively small size. It differs from typical *P. cumatodes* (see Alcock et al. 1907: pl. 79, fig. 1, 1A; Guinot 1968: fig. 60; Serène 1984: pl. 30C; Mendoza et al. 2012: fig. 1D–F) in having the carapace proportionately less broad, the grooves and ridges on the dorsal carapace surface less prominent and the grooves on the thoracic sternum relatively shallower (Fig. 6G, H). The G1 of the present specimen is developed and its structure agrees relatively well with that figured by Mendoza et al. (2012: fig. 2E, G–I) for *P. cumatodes*, except that the distal half is more gently curved and the distal setae less dense (Fig. 7N, O).

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References

Ahyong ST, Naruse T, Tan SH, Ng PKL (2009) Part II. Infraorder Brachyura: Sections Dromiacea, Raninoida, Cyclodorippoida. In: Chan T-Y, Ng PKL, Ahyong ST, Tan SH (Eds) Crustacean Fauna of Taiwan: Brachyuran Crabs, Vol. 1, 27–180.

Alcock A (1894) Natural history notes from H.M. Indian Marine Survey Steamer *Investigator*, Commander RF Hoskyn, RN, commanding. Series. II. No. 1. On the result of the deep-sea dredging during the season 1890–91. Annals and Magazine of Natural History (6)13: 225–245, 321–334, 400–411. <https://doi.org/10.1080/00222939408677694>

Alcock A (1895) Materials for a carcinological fauna of India. No. 1. The Brachyura Oxyrhyncha. Journal of the Asiatic Society of Bengal 64, part 2(2): 157–291.

Alcock A (1896) Materials for a carcinological fauna of India. No. 2. The Brachyura Oxystoma. Journal of the Asiatic Society of Bengal 65: 134–296.

Alcock A (1899a) Illustrations of the zoology of the Royal Indian Marine survey ship investigator, under the command of commander T.H. Heming, R.N. Fishes. Part VI, Plates XXV. Crustacea.-Part VII, Plates 36–45. Published under the Authority of Captain W. S. Goodridge, R.N., Director of the Royal Indian Marine. Calcutta: Office of the Superintendent of Government Printing, India. [For authorships and publication dates see Clark and Crosnier 1992]

Alcock A (1899b) Materials for a carcinological fauna of India. No. 4. The Brachyura Cyclometopa. Part II. A revision of the Cyclometopa with an account of the families Portunidae, Cancridae and Corystidae. Journal of the Asiatic Society of Bengal, Calcutta 68: 1–104.

Alcock A, Annandale N, MacGilchrist AC (1907) Illustrations of the Zoology of the Royal Indian Marine Survey Ship Investigator, under the command of Captain T.H. Heming, R.N. (Retired). Crustacea (Malacostraca) – Pt. XII, Plates 77–79. Crustacea (Entomostraca) – Pt. I, Plates 1–11. Mollusca – Pt. IV, Plates 14–18. Published under the Authority of Captain GH Hewett, R.N., Director of the Royal Indian Marine. Calcutta: Office of the Superintendent of Government Printing, India. [For authorships and publication dates see Clark and Crosnier 1992]

Anonymous (1891) Appendix No. XIII. Administration Report of the Indian Marine for the Official Year 1890–91. The Government Central Press, Bombay, 52–57.

Anonymous (1914) Biological collections of the R.I.M.S. "Investigator." List of stations. 1884–1913. Trustees of the Indian Museum, Baptist Mission Press, Calcutta 2: 35 pp.

Apel M, Spiridonov VA (1998) Taxonomy and zoogeography of the portunid crabs (Crustacea: Decapoda: Brachyura: Portunidae) of the Arabian Gulf and adjacent waters. Fauna of Arabia 17: 159–331.

Balss H (1929) Decapoden des Roten Meeres. IV. Die Oxyrhynchen und Schlussbetrachtungen. In: Expedition S.M. Schiff Pola in das Rote Meer, nördliche und südliche Hälften 1895/96–1897/98. Zoologische Ergebnisse XXXVI. Denkschriften Akademie Wissenschaften in Wien 102: 1–30. [pl. 1]

Borradaile LA (1902) Marine Crustaceans. I. On Varieties. II. Portunidae. In: Gardiner JS (Ed.) The Fauna and Geography of the Maldives and Laccadive Archipelagoes: Being the Account of the Work carried on and of the Collections made by an Expedition during the years 1899 and 1900, 1(2): 191–208. [figs 35–38]

Cai E-X, Huang Z-G, Dai A-Y, Chen H-L, Yang S-L (1994) Brachyura. In: Huang Z-G (Ed.) Marine species and their distributions in China's Seas, Department of Ocean Management and Monitoring State Oceanic Administration. China Ocean Press, Beijing, 576–600.

Castro P (2007) A reappraisal of the family Gonoplacidae MacLeay, 1838 (Crustacea, Decapoda, Brachyura) and revision of the subfamily Gonoplacinae, with the description of ten new genera and eighteen new species. *Zoosystema* 29(4): 609–773.

Castro P, Ng PKL (2010) Revision of the family Euryplacidae Stimpson, 1871 (Crustacea: Decapoda: Brachyura: Gonoplacoidea). *Zootaxa* 2375: 1–130. <https://doi.org/10.11646/zootaxa.2375.1.1>

Chen H, Sun H (2002) Arthropoda Crustacea. Brachyura. Marine primitive crabs. Fauna Sinica. Invertebrata, 30, Science Press, Beijing, 597 pp. [colour pls 1–4, pls 1–16]

Chiong WL, Ng PKL (1998) A revision of the buckler crabs of the genus *Cryptopodia* H. Milne Edwards, 1834 (Crustacea: Decapoda: Brachyura: Parthenopidae). *Raffles Bulletin of Zoology* 46(1): 157–216.

Clark PF, Crosnier C (1992) Illustrations of the Zoology of the R.I.M.S. *Investigator*: authors, dates, issues, plates and titles. *Archives of Natural History* 19(3): 365–374. <https://doi.org/10.3366/anh.1992.19.3.365>

Crosnier A (1975) Sur quelques Portunidae, Grapsidae et Ocypodidae (Crustacea Decapoda Brachyura) de Madagascar ou des îles avoisinantes, nouveaux, rares ou non encore signalés. *Bulletin du Muséum national d'Histoire naturelle, Section A (Zoology)*, série 3, 214(304): 711–741.

Dai A-Y, Yang S-L (1991) Crabs of the China Seas. China Ocean Press, Beijing and Springer-Verlag, Berlin, 608 pp. [figs 1–295, pls 1–74]

Dai A-Y, Yang S-L, Song Y-Z, Chen G-X (1986) Crabs of the China Seas. China Ocean Press, Beijing, Vol. 11, 642 pp. [In Chinese]

Davie PJF (1987) A new species and new records of *Portunus* (Decapoda: Portunidae) from Northern Australia. *Memoirs of the Queensland Museum* 25(1): 227–231.

Davie PJF, Guinot D, Ng PKL (2015a) Anatomy and functional morphology of Brachyura. In: Castro P, Davie PJF, Guinot D, Schram FR, von Vaupel Klein JC (Eds), *Treatise on Zoology – Anatomy, Taxonomy, Biology. The Crustacea. Volume 9C–I. Decapoda: Brachyura* (1): 11–163. https://doi.org/10.1163/9789004190832_004

Davie PJF, Guinot D, Ng PKL (2015b) Classification and Systematics and classification of Brachyura. In: Castro P, Davie PJF, Guinot D, Schram FR, von Vaupel Klein JC (Eds), *Treatise on Zoology – Anatomy, Taxonomy, Biology. The Crustacea. Volume 9C–II. Decapoda: Brachyura (Part 2)*, 1049–1130.

Davie PJF, Ng PKL, Kaenphet A, Aungtonya C (2002) Annotated checklist of Brachyura (Crustacea: Decapoda) principally obtained during the BIOSHELF survey off western Thailand from 1996–1998. In: Bruce NL, Berggren M, Bussawarit S (Eds) *Biodiversity of Crustacea of the Andaman Sea, Proceedings of the International Workshop on the Biodiversity of Crustacea in the Andaman Sea*. Phuket Marine Biological Center, 29 November to 20 December 1998. *Phuket Marine Biological Center Special Publication* 23(2): 313–339.

Dev Roy MK (2013) Diversity and distribution of marine brachyuran crab communities inhabiting West Coast of India. In: Venkataraman C, Sivaperuman, Raghunathan C (Eds)

Ecology and Conservation of Tropical Marine Faunal Communities Part 1. Springer, Berlin/Heidelberg, 147–169. https://doi.org/10.1007/978-3-642-38200-0_10

Dev Roy MK (2015) Conservation concerns on crustacean fauna of India. *Journal of Environment and Sociobiology* 12(1): 77–98.

Dev Roy MK, Nandi, NC (2007) Brachyuran diversity in coastal ecosystems of Tamil Nadu. *Journal of Environment and Sociobiology* 4(2): 169–192.

Dev Roy MK, Nandi NC (2012) Brachyuran crabs (Crustacea). In: Director ZSI, Kolkata (Ed.) Fauna of Andaman and Nicobar islands, State Fauna Series, Zoological Survey of India, Kolkata 19(1): 185–236.

Flipse HJ (1930) Die Decapoda Brachyura der Siboga-Expedition. VI. Oxyrhyncha: Parthenopidae. *Siboga Expédition* 39c²: 1–96.

Galil BS (2001) A revision of the genus *Arcania* Leach, 1817 (Crustacea: Decapoda: Leucosioidea). *Zoologische Mededelingen* 75(11): 169–205.

Guinot D (1968) Recherches préliminaires sur les groupements naturels chez les Crustacés Décapodes Brachyoures. IV. Observations sur quelques genres de Xanthidae. *Bulletin du Muséum national d'Histoire naturelle*, série 2, 39(4), 1967(1968): 695–727.

Guinot D (1969) Recherches préliminaires sur les groupements naturels chez les Crustacés Décapodes Brachyoures, VII. Les Goneplacidae (suite). *Bulletin du Muséum national d'Histoire naturelle*, série 2, 41(2): 507–528. [pl. 2]

Guinot D (1971) Recherches préliminaires sur les groupements naturels chez les Crustacés Décapodes Brachyoures, VIII. Synthèse et bibliographie. *Bulletin du Muséum national d'Histoire naturelle*, série 2, 42(5) [1970]: 1063–1090.

Henderson JR (1893) A contribution to Indian carcinology. *Transactions of the Linnaean Society of London Zoology*, series 2, 5: 325–458. <https://doi.org/10.1111/j.1096-3642.1893.tb00653.x>

Herbst JFW (1782–1804) Versuch einer Naturgeschichte der Krabben und Krebse nebst einer systematischen Beschreibung ihrer verschiedenen Arten. Gottlieb August Lange, Berlin & Stralsund. Volumes 1–3: 1–274 + 1–226 + 1–66 + 1–46, 1–54 + 1–49. [Vol. 1, Part 1 (pp 1–86, pl 1): 1782; Vol. 1, Parts 2–5 (pp 87–182, pls 2–9): 1783; Vol. 1, Part 6 (pp 183–206, pls 10–13): 1785; Vol. 1, Part 7 (pp 207–238, pls 14–17): 1788; Vol. 1, Part 8 (pp 239–274, pls 18–21): 1790; Vol. 2, Part 1 (pp 1–48, pls 22–25): 1791; Vol. 2, Part 2 (pp 49–78, pls 26–29): 1792; Vol. 2, Part 3 (pp 79–98, pls 30–33): 1793; Vol. 2, Part 4 (pp 99–146, pls 34–36): 1793; Vol. 2, Part 5 (pp 147–162, pls 37–40): 1794; Vol. 2, Parts 6–end (pp 163–226, pls 41–46): 1796; Vol. 3, Part 1 (pp 1–66, pls 47–50): 1799; Vol. 3, Part 2 (pp 1–46, pls 51–54): 1801; Vol. 3, Part 3 (pp 1–54, pls 55–58): 1803; Vol. 3, Part 4 (pp 1–49, pls 59–62): 1804.]

Huys R, Low MEY, De Grave S, Ng PKL, Clark PF (2014) On two reports associated with James Wood-Mason and Alfred William Alcock published by the Indian Museum and the Indian Marine Survey between 1890 and 1891: implications for malacostracan nomenclature. *Zootaxa* 3757(1): 1–78. <https://doi.org/10.11646/zootaxa.3757.1.1>

ICZN (1999) International Code of Zoological Nomenclature. International Commission of Zoological Nomenclature. Fourth Edition. Adopted by the XXI General Assembly of the International Union of Biological Sciences. International Trust for Zoological Nomenclature, in association with the British Museum (Natural History), London, 338 pp.

Jeyabaskaran R, Khan AS, Ramaiyan V (2000) Biodiversity project on Gulf of Mannar biosphere reserve. Parangipettai, India. Centre of Advanced Study in Marine Biology, Annamalai University, 177 pp.

Kathirvel M, Gokul A (2010) Checklist of brachyuran crabs from the Gulf of Mannar marine biosphere reserve. Technical Bulletin 4. The Fisheries Technocrats Forum, Chennai, 45 pp.

Lai JCY, Mendoza JCE, Guinot D, Clark PF, Ng PKL (2011) Xanthidae Macleay, 1838 (Decapoda: Brachyura: Xanthoidea) systematics: a multi-gene approach with support from adult and zoeal morphology. *Zoologischer Anzeiger* 250: 407–448. <https://doi.org/10.1016/j.jcz.2011.07.002>

MacGilchrist AC (1905) Natural History Notes from the R.I.M.S. 'Investigator', Capt. T. H. Heming, R.N. (retired), commanding. Series III, No. 6. An account of the new and some of the rarer Decapod Crustacea obtained during the Surveying Seasons 1901–1904. *Annals and Magazine of Natural History*, Series 3, 7(87): 233–268. <https://doi.org/10.1080/03745480509443038>

Mendoza JCE, Kazmi QB, Moassam M (2012) First report of two rare xanthid crabs (Crustacea: Decapoda: Brachyura: Xanthidae) from Pakistan. *Marine Biodiversity Records* 5, e51: 1–5. <https://doi.org/10.1017/S1755267211001084>

Mendoza JCE, Ng PKL (2012) A new genus and species of deep-water xanthid crab (Decapoda, Brachyura, Xanthidae) from the Philippines. In: Komatsu H, Okuno J, Fukuoka K (Eds) *Studies on Eumalacostraca: a homage to Masatsune Takeda*. Crustaceana Monographs 17: 197–210.

Michel C (1964) Check List of the Crustacea Brachyura (Crabs) recorded from Mauritius. *Mauritius Institute Bulletin* 6(1): 1–48.

Milne-Edwards A (1861) Études zoologiques sur les Crustacés récents de la famille des Portuniens. *Archives du Muséum d'Histoire naturelle* 10: 309–428. [pls 28–38] <https://doi.org/10.5962/bhl.title.10629>

Ng PKL, Abdelsalam KM, Mona MH, Nour Eldeen MF (2018) A synopsis of the genus *Eurycarcinus* A. Milne-Edwards, 1867 (Decapoda, Brachyura, Pilumnidae). *Crustaceana* 91(4): 471–487. <https://doi.org/10.1163/15685403-00003775>

Ng PKL, Davie PJF (2002) A checklist of the brachyuran crabs of Phuket and western Thailand. In: Bruce NL, Berggren M, Bussawarit S (Eds) *Biodiversity of Crustacea of the Andaman Sea, Proceedings of the International Workshop on the Biodiversity of Crustacea in the Andaman Sea*. Phuket Marine Biological Center, 29 November to 20 December 1998. *Phuket Marine Biological Center Special Publication* 23(2): 369–384.

Ng PKL, Guinot D, Davie PJF (2008) *Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world*. Raffles Bulletin of Zoology, Supplement 17: 1–286.

Ng PKL, Rahayu DL (2000) On a small collection of Parthenopidae from Indonesia, with description of a new species of *Pseudolambrus* (Crustacea: Decapoda: Brachyura). *Proceedings of the Biological Society of Washington* 113(3): 782–791.

Ng PKL, Türkay M, Galil BS (2014) On the identity of *Cancer urania* Herbst, 1801 (Crustacea: Decapoda: Brachyura: Leucosiidae). *Zootaxa* 3786(2): 124–134. <https://doi.org/10.11646/zootaxa.3786.2.2>

Promdam R, Nabhitabhata J, Galil BS (2014) A new species of *Coleusia* Galil, 2006 (Decapoda: Brachyura: Leucosiidae) from southern Asia. *Zootaxa* 3786(2): 135–140. <https://doi.org/10.11646/zootaxa.3786.2.3>

Rahayu DL, Ng PKL (2014) New genera and new species of Hexapodidae (Crustacea, Brachyura) from the Indo-West Pacific and east Atlantic. *Raffles Bulletin of Zoology* 62: 396–483.

Rathbun MJ (1902) Crabs from the Maldives Islands. *Bulletin of the Museum of Comparative Zoology, Harvard College* 39(5): 123–138. [pl. 1]

Sakai K (1999) JFW Herbst-collection of decapod Crustacea of the Berlin Zoological Museum, with remarks on certain species. *Naturalists, Publications of Tokushima Biological Laboratory, Shikoku University* 4: 1–45. [pls 1–21]

Sakai T (1964) On two new genera and five new species of xanthoid crabs from the collection of His Majesty the Emperor of Japan made in Sagami Bay. *Crustaceana* 8(1): 97–106. <https://doi.org/10.1163/156854065X00596>

Sakai T (1969) Two new genera and twenty-two new species of crabs from Japan. *Proceedings of the Biological Society of Washington* 82: 243–280.

Sakai T (1976) Crabs of Japan and the Adjacent Seas. 3 Vols. Kodansha Ltd., Tokyo (29): 773 pp. [English text], 461 pp. [Japanese text]. [251 pls]

Serène R (1968) The Brachyura of the Indo Pacific Region. *Prodromus for a Check List of the Non-planctonic Marine Fauna of South East Asia. Special Publication of the Singapore National Academy of Science*, No. 1: 33–120.

Serène R (1984) Crustacés Décapodes Brachyoures de l’Océan Indien Occidental et de la Mer Rouge, Xanthoidea: Xanthidae et Trapeziidae. Avec un addendum par Crosnier A: Carpiliidae et Menippidae. *Faune Tropicale* 24: 1–400. [figs A–C, 1–243, pls 1–48]

Serène R, Soh CL (1970) New Indo-Pacific genera allied to *Sesarma* Say 1817 (Brachyura, Decapoda, Crustacea). *Treubia* 27(4): 387–416. [pls 1–8]

Shen C-J, Dai A-Y, Chen H-L (1982) New and rare species of Parthenopidae (Crustacea: Brachyura) from China Seas. *Acta Zootaxonomica Sinica* 7(2): 139–149. [pls 1, 2]

Stephensen K (1946) The Brachyura of the Iranian Gulf. With an appendix: The male pleopoda of the Brachyura. In: Jessen K, Spärck R (Eds) *Danish Scientific Investigations in Iran, Part 4* [1945], 1–237.

Stephenson W (1972a) Portunid crabs from the Indo-West Pacific and Western America in the Zoological Museum, Copenhagen (Decapoda, Brachyura, Portunidae). *Steenstrupia* 2(9): 127–156.

Stephenson W (1972b) An annotated check list and key to the Indo-West Pacific swimming crabs (Crustacea: Decapoda: Portunidae). *Bulletin of the Royal Society of New Zealand* 10: 1–64.

Stevčić Z (2005) The reclassification of Brachyuran Crabs (Crustacea: Decapoda: Brachyura). *Natura Croatica (Fauna Croatica)* 14(1): 1–159.

Tan CGS (1996) Leucosiidae of the Albatross expedition to the Philippines, 1907–1910 (Crustacea: Brachyura: Decapoda). *Journal of Natural History* 30(7): 1021–1058. <https://doi.org/10.1080/00222939600770551>

Trivedi JN, Trivedi DJ, Vachhrajani KD, Ng PKL (2018) An annotated checklist of marine brachyuran crabs (Crustacea: Decapoda: Brachyura) of India. *Zootaxa* 4502(1): 1–83.

Wood-Mason J, Alcock A (1891) Natural History Notes from H.M. Indian Marine Survey Steamer "Investigator", Commander R.F. Hoskyn, R.N., commanding. No. 21. On the Results of the last Season's Deep-sea Dredging. *Annals and Magazine of Natural History*, March 1891 (6)7(39): 258–272.

Vidhya V, Jawahar P, Karuppasamy K (2017) Annotated check list of the brachyuran crabs (Crustacea: Decapoda) from Gulf of Mannar region, south east coast of India. *Journal of Entomology and Zoology Studies* 5(6): 2331–2336.